SIEMENS

SIMATIC

PC Adapter
TS Adapter

Quick Reference Guide

Exclusion of Liability

We have checked the contents of this manual for agreement with the hardware and software described. Since deviations cannot be precluded entirely, we cannot guarantee full agreement. However, the data in this manual are reviewed regularly and any necessary corrections included in subsequent editions. Suggestions for improvement are welcomed.

Technical data subject to change.

Siemens Aktiengesellschaft

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Contents

1   Product Definition

The adapter is available as:

*   PC adapter 6ES7 972-0CA2x-0XA0
    or
*   TS adapter 6ES7 972-0CA3x-0XA0

Note

Where 'adapter' is referred to below, the text applies to both variants.

The PC adapter connects a PC to the MPI/DP interface (**M**ulti**p**oint **I**nterface) via the serial COM port of an S7/M7/C7 system.

This does not require a PC slot, that is, the adapter is also suitable for use in non-expandable PCs such as notebooks.
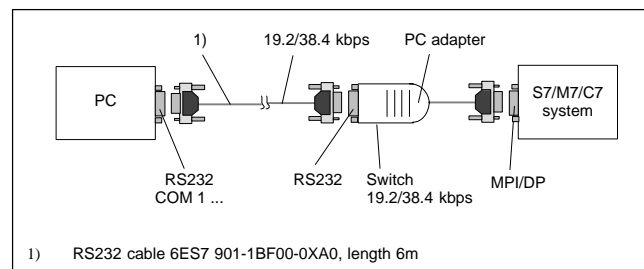
Figure 1-1   PC Adapter in the System

With 'direct connection', the TS adapter allows you to link programming devices/PCs with S7/M7/C7 systems. With this setup, the TS adapter corresponds in functionality to the PC adapter.

With 'modem connection', the TS adapter enables you to link programming devices/PCs with S7/M7/C7 systems over the telephone network.

Direct Connection

Modem Connection

1) RS232 cable 6ES7 901-1BF00-0XA0, length 6m
2) Modem cable (supplied with modem)
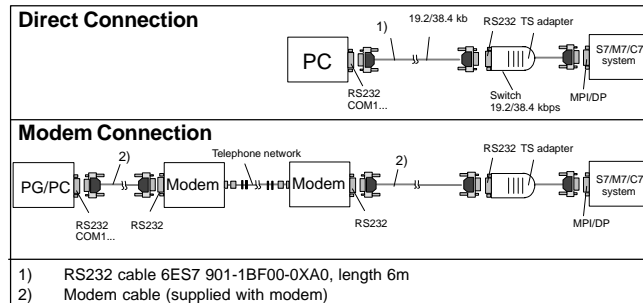
Figure 1-2   TS Adapter in the System

The TeleService optional package is always required to operate the TS adapter (see 5.2 Software). The switch on the adapter is used to change the transmission rate on the RS232 side in direct connection. With modem connection, it has no function.
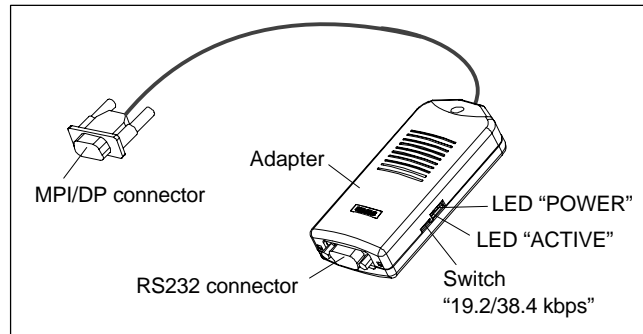
Figure 1-3   Adapter

The two adapter types differ with respect to the location of the MPI/DP parameters:

- The MPI/DP parameters for the PC adapter are set in "Set PG/PC interface". When opening an online display for the first time, ther parameters are transferred to the PC adapter.

- The MPI/DP parameters for the TS adapter are set via a Teleservice application and stored permanently on the TS adapter. When opening an online display for the first time, these parameters are activated.

2   Package Components

- Adapter
- Quick Reference Guide
- Mounting assembly (TS adapter only)

3   Accessories (not part of the adapter package)

- RS232 cable, 6 meters in length 6ES7 901-1BF00-0XA0
  (required to operate the PC adapter and to operate the
  TS adapter in direct connection only).

4   MPI/DP Network

A maximum of 32 nodes can be interfaced to an MPI/DP
network segment. The total cable length may not exceed 50
meters. Using so-called RS485 repeaters, several network
segments can be combined to form a network comprising a
maximum of 127 nodes.
The data signalling rate in an MPI/DP network is max. 12
Mbit/s.

Der Adapter unterstützt Übertragungsraten bis max.
1,5 Mbit/ s.

Note
Also refer to "S7-300, Hardware and Installation".

Warning

If the transmission rate is 187.5 Kbits/sec and
higher, it is <u>not</u> allowed to insert cable extensions
in the S7/M7/C7 adapter system connection
(spur lines not allowed).

5   Prerequisites for Operation

5.1   Hardware

PC/programming device with a free COM port (COM1 or COM2, 9-pin COM connection). Appropriate adapters for other connector combinations are available in specialist shops, for example 9-pin to 25-pin subminiature D connector.
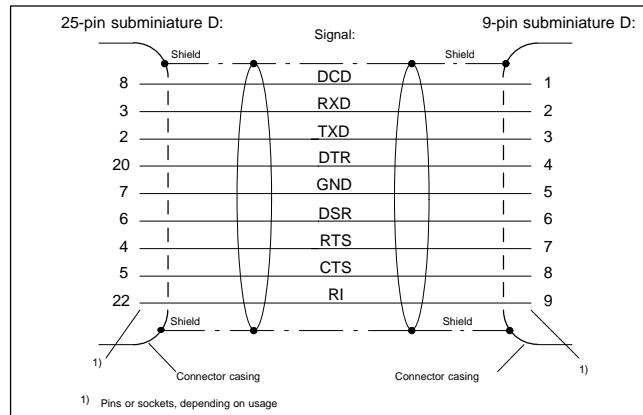
Figure 1-4   9-Pin - 25-Pin RS232 Adapter

5.2   Software

PC adapter

- STEP 7 Standard Package from V1 <u>or</u>
- S7 DOS

TS adapter

- STEP 7 Standard Package from V3.1 <u>and</u>
- TeleService optional package from Version 3.0

6   Connecting the Adapter

6.1   Safety-related Guidelines

Qualified Personnel

A device/system may only be commissioned or operated by **qualified personnel**. Qualified personnel as referred to in safety guidelines in this document are persons authorized to energize, de-energize, clear, ground, and tag circuits, equipment and systems in accordance with established safety practice. For a detailed description of the safety-related guidelines, please refer to the Appendix.

Proper Usage

Please observe the following:

⚠ **Warning**

The equipment/system or the system components may only be used for the applications described in the catalog or the technical description, and only in combination with the equipment, components, and devices of other manufacturers as far as this is recommended or permitted by Siemens.

The product will function correctly and safely only it it is transported, stored, set up, and installed as intended, and operated and maintained with care.

Cleaning the Device

The device may be cleaned only using a soft cotton cloth and neutral detergent. Make sure that no liquid penetrates the housing.

6.2 General Remarks

MPI/DP side:

Adapter and S7/M7/C7 system each represent one network node. In networks comprising two nodes (adapter and S7/M7/C7 system), the adapter is plugged directly into the S7/M7/C7 system's MPI/DP port; in networks consisting of more than two nodes, the adapter is plugged into a Profibus connector's "PG port" (SINEC L2 bus connector); for details, please refer to catalog IK10.
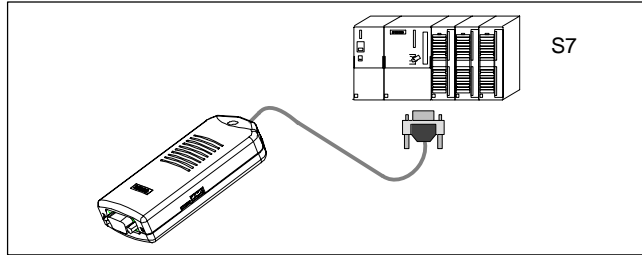
Figure 1-5   Connecting to an S7 System
(Two Network Nodes)

3) Bus connector with PG port
4) Profibus connector
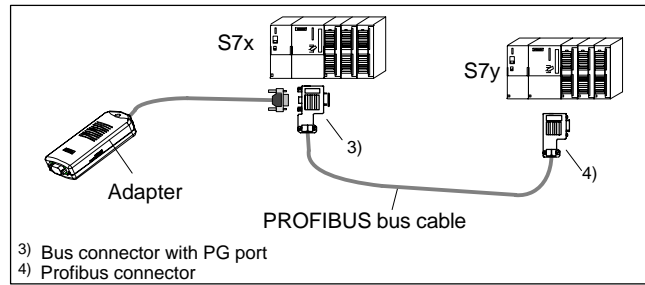
Figure 1-6   Connecting to Networked S7 Systems
(MPI/DP Network , Two or More Network
Nodes)

As the adapter receives its power supply via the MPI/DP interface, only those interfaces can be used which provide 24 V DC <u>and</u> 5 V DC with the voltages and currents specified in the table in the "Technical Specifications" (Chapter 7). Therefore a connection at the free end of a PROFIBUS cable is not possible.
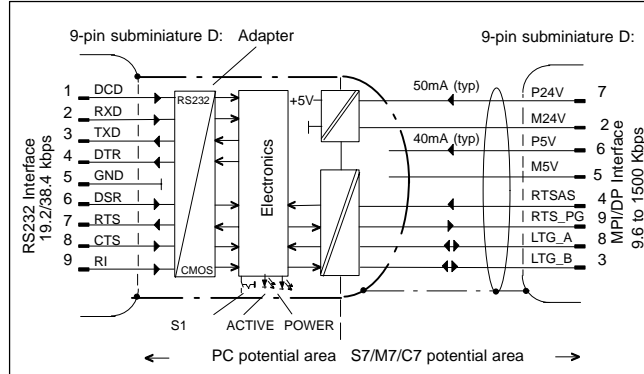
Figure 1-7   Block Diagram of the Adapter

The adapter provides electrical isolation between its MPI/DP interface and RS232 interface within a safety extra-low voltage (SELV) circuit, thus allowing direct operation even on ungrounded S7/M7/C7 systems.

RS232 side:

● See Figures 1-1/1-2 "PC/TS Adapter in the System" for direct connection details. An RS232 cable is required to connect a PC/programming device to the adapter's RS232 interface (COM2-PC-compatible). This cable must be ordered separately (see 3. "Accessories").
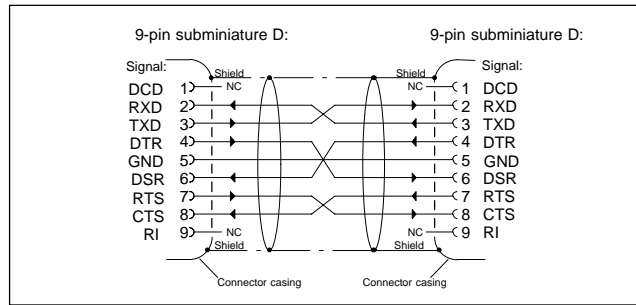
Figure 1-8   RS232 Cable 6ES7 901-1BF00-0XA0

⚠ **Warning**

The RS232 cable listed under Point 3 (Accessories) ensures that EMC requirements are met.

This cannot be guaranteed if you use a different cable and you do so at your own risk.

- See Figure 1-2 "TS Adapter in the System" for details of modem connection. A modem is connected to the RS232 interface of the TS adapter using the enclosed RS232 cable. In the modem description, this cable is used for connecting the modem to a PC. If this modem cable does not have a 9-pin SUB-D socket connector on the TS adapter side, the relevant adapter must be used (Figure 1-5).

6.3   Pin Configuration

The MPI/DP connector has the following pin configuration:
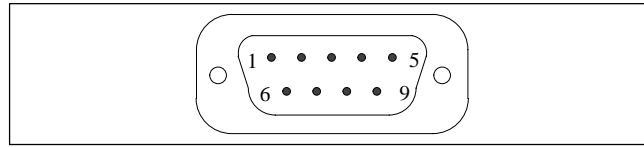
Figure 1-9   MPI/DP Connector

Signals

Pin No.	Abbre-viation	Description	Input/ Output
1	NC	Pin is unassigned	-
2	M24V	24 V supply's 0 V line, sup-plies adapter electronics via DC/DC converter (PC potential area)	Input
3	LTG_B	Data line B	Input/out-put
4	RTSAS	RTSAS Control signal for receive data current; the signal is active '1' when the directly connected interface module is transmitting.	Input
5	M5V	5 V supply's 0 V line, supplies the adapter's S7/M7/C7 potential area	Input
6	P5V	5 V supply's +5V line, supplies the adapter's S7/M7/C7 potential area	Input

Pin No.	Abbre- viation	Description	Input/ Output
7	P24V	24V supply's +24V line, supplies adapter electronics via DC/DC converter (PC potential area)	Input
8	LTG_A	Data line A	Input/out- put
9	RTS_P G	Adapter's RTS output signal. The signal is '1' when the adapter is transmitting.	Output
Shield		On connector casing*	

* The shield is interconnected with the RS232 connector via the adapte casing's shield.

The RS232 connector has the following pin assignments:
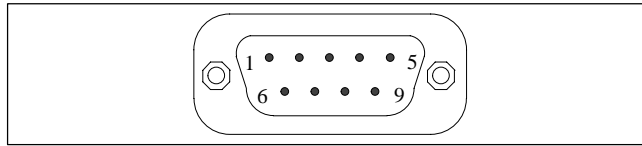
Figure 1-10   RS232 Connector (PC-compatible)

Signals

Pin No.	Abbrevia-tion	Description	Input/Output
1	DCD	Data Carrier Detect	Input
2	RXD	Received Data	Input
3	TXD	Transmitted Data	Output
4	DTR	Data Terminal Ready	Output
5	GND	Reference potential (0V) for all RS232 signals (Signal Ground)	
6	DSR	Data Set Ready	Input
7	RTS	Request to Send	Output
8	CTS	Clear to Send	Input
9	RI	Ring Indicator	Input
Shield		On connector casing*	

* The shield is interconnected with the MPI/DP connector via the adapter casing's shield and the MPI/DP cable shield.

6.4   Connection Procedures

```
                    ( Start )
                        |
              ┌──────────────────┐
              │ Switch PC/       │
              │ modem off        │
              └──────────────────┘
                        |
              ┌──────────────────┐
              │ Establish cable  │        (see 6.2 "General", RS232 side)
              │ connection on    │
              │ RS232 side of    │
              │ the adapter      │
              └──────────────────┘
                        |                 (See 6.2 "General", MPI/DP side)
              ┌──────────────────┐        => Microprocessor in adapter starts
              │ Connect MPI/DP   │        to work and switches the Power
              │ connector of     │        LED to constant light after blinking
              │ adapter to       │        three times (see also 6.6 "Function
              │ S7/M7/C7 system  │        of the Power LED")
              └──────────────────┘
                        |
              ┌──────────────────┐
              │ Switch PC/       │
              │ modem on         │
              └──────────────────┘
        N               |
        <───────< 1st startup? >
                        | Y
              ┌──────────────────┐
              │ Start "Set PG/PC │
              │ interface"       │
              └──────────────────┘
                        |
              ┌──────────────────┐
              │ Install adapter  │        Can be done on installing the
              └──────────────────┘        STEP 7 Standard Package. If so,
                        |                  check settings now.
              ┌──────────────────┐
              │ Parameter-       │
              │ ize interface    │
              └──────────────────┘
                        |
              ┌──────────────────┐
              │ Close "Set PG/PC │
              │ interface"       │
              └──────────────────┘
                        |               N
                  < TS adapter? >─────────>
                        | Y               Parameterization resident in the TS adapter.
              ┌──────────────────┐        Reparameterization is possible in direct
              │ Check            │        connection and in modem connection.
              │ "parameterization"│
              │ with TS application│
              └──────────────────┘
                        |
                       ─X─
                        |
              ┌──────────────────┐
              │ Start PG/PC ->   │        LED "Active" indicates that the adapter is
              │ MPI/DP network   │        active in the MPI/DP network.
              │ communication    │
              └──────────────────┘
                        |
                    ( End )
```

6.5   Function and Operation of the Switch

The switch is used for setting the transmission rate
(19.2 kbps or 38.4 kbps) on the RS232 side of the adapter
variant in direct connection. It has no function with modem
connection.

The transmission rate set with the switch must agree with the
rate parameterized for the PC in "Set PG/PC interface".

Note
A Transmission speed of 38,4 kbit/s is only possible using
STEP 7 Version 3.1 or higher.
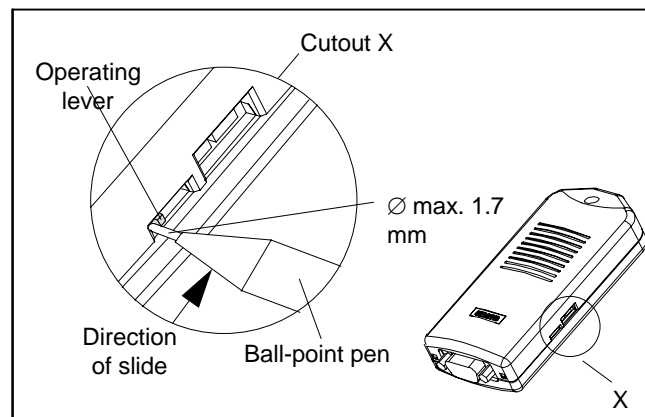
Operating the switch:

Figure 1-11   Location of the Switch

Note
Operating the switch resets the software parameterization of
the adapter.

The switch is operated only infrequently and is recessed so that it cannot be operated inadvertently. See Figure 1-11 for the location of the switch. Both switch positions are labeled on the underside of the unit.

To operate the switch, please use a ball-point pen ("retractable ball-point") up to a diameter of 1.7 mm or a blunt instrument of the same size. Insert the extended point between the operating lever and the housing cutout on the side with the operating lever, and slide the operating lever into the opposite position (see Figure 1-11).

> ⚠ **Warning**
>
> Pointed objects (for example, needles) or breakable objects (for example, pencils) must not be used for operating the switch.

6.6 Function of the Power LED

LED	Meaning	Response
Off	• 24 V DC supply voltage missing	Check voltage supply
	• Fatal hardware fault	Replace adapter
Constant blinking	Hardware fault detected per software	Replace adapter
On	Ready for use*	

* After switching on, a few seconds will elapse before the LED lights up.

6.7 Function of the active LED

The active LED shows that the adapter on the MII/DP bus is transmitting.

7   Technical Specifications

All required specifications are listed in the table below.

Designation	Technical Specifications
PC adapter	
Order number	PC Adapter 6ES7 972-0CA2x-0XA0 TS Adapter 6ES7 972-0CA3x-0XA0
Dimensions	108 mm x 50 mm x 24 mm (4.25 in. x 1.96 in. x 0.94 in.) (L x W x H)
Weight	Approx. 0.15 kilograms

Interfaces
  to S7/M7/C7
  to PC
	RS485 (bis max. 1,5 Mbit/s)
	RS232 (19.2 kbps / 38.4 kbps/can be set with switch)

Supply voltage (V_N)	$V_N1 = 24$ VDC (17 VDC to 30 VDC) $V_N2 = 5$ VDC (4.8 VDC to 5.25 VDC) V1 and V2 are taken from the MPI/DP interface of the S7/M7/C7 system. Both voltage sources must be limited to a nominal current of ≤ 3 A by means of overcurrent limiting or fuses.
Power input (I_N)	I_1= 50 mA (typ.)/90 mA (max.) I_2= 40 mA (typ.)/70 mA (max.) Two network nodes, terminators inoperative, no fuses in adapter.
Inrush current	I_1 max. 0.5 A; 14 ms I_2 max. 0.2 A; 1.5 ms
Type of protection	IP20
Safety	
VDE specification	VDE 0805 $\equiv$ EN 60950 $\equiv$ IEC 950
Noise emisson	<45dB(A) to DIN 45635 (no fan)

Designation	Technical Specifications
Electromagnetic compatibility (EMC)	
Emitted interference Limit class	B to EN 55022 = CISPR 22
Interference immunity on signal lines	±2kV (to IEC 801-4/ IEC 1000-4-4; Burst)

Interference immunity against discharging of static electricity	±6kV Contact discharge
	            (to IEC 801-2/IEC 1000-4-2;
	            ESD)
	 ±8kV Air discharge (to IEC 801-2/IEC
	 1000-4-2; ESD)

Highfrequency radiation	10 V with 80% amplitude modulation at 1 kHz, 10 kHz - 80 MHz (to ENV 50141) 10 V/m with 80% amplitude modulation at 1 kHz, 80 Mhz - 1GHz (to ENV 50140) 10 V/m pulse-modulated 50% load factor at 900 MHz (to ENV 50204)
Climatic conditions	

Temperature
 	
      operation
 	
      storage/
      shipping
	Tested to DIN IEC 68-2-1, DIN IEC 68-2-2
	      ±0°C to +60°C
	 (rate of temperature change
	 max. 10 °C/h)
	 -40°C to +70°C
	 (rate of temperature change
	 max. 20°C/h)

Relative humidity
      operation
      storage/
      shipping
	Tested to DIN IEC 68-2-3
	      5% to 85% at 30°C (no condensation)
	      5% to 93% at 40°C (no condensation)

Designation	Technical Specifications
Mechanical environmental conditions	

Vibration
       Operation
 	
       shipping
       (adapter
       packed
       for
       transport)
	Tested to DIN IEC 68-2-6
	     10 to 58 Hz, amplitude 0.075 mm
	     58 to 150 Hz acceleration 9.8 m/s^2
	     5 - 9 Hz, amplitude 3.5 mm
	
	9 - 500 Hz, acceleration 9.8 m/s^2

Shock
     operation
     shipping
     (adapter
     packed for
     transport)
	Tested to DIN IEC 68-2-27/29
	     Half sine: 100 m/s^2 (10 g), 16 ms
	     Half sine: 250 m/s^2 (25 g), 6 ms

Special features	
Quality assurance	To ISO 9001
Maintenance	Maintenance free (no battery)

7.1   Supplied PC/TS Adapter Versions

Product	MLFB	Version
PC Adapter	6ES7972-0CA20-0XA0	V3.0
	6ES7972-0CA21-0XA0	V3.1
	6ES7972-0CA22-0XA0	V5.0
	6ES7972-0CA23-0XA0	V5.1
TS Adapter	6ES7972-0CA30-0XA0	V3.0
	6ES7972-0CA32-0XA0	V5.0
	6ES7972-0CA33-0XA0	V5.1
	6ES7972-0CA34-0XA0	V5.2

7.2   Features of the PC/TS Adapter Versions

PC Adapter	V3.0	V3.1	V5.0	V5.1
Transmission speed to PC	19.2 Kbps	19.2 Kbps and 38.4 Kbps	19.2 Kbps and 38.4 Kbps	19.2 Kbps and 38.4 Kbps
Transmission speed of MPI/DP network	187.5 Kbps	187.5 Kbps	9.6 Kbps to 1.5 Mbps	9.6 Kbps to 1.5 Mbps
DP transport protocol [1]	–	–	✔	✔
Routing support [2]	–	–	✔	✔
Baud rate and profile search	–	–	–	✔
Services with slave initiative	–	–	–	✔

[1] Enables communication with slaves on MPI/DP network

[2] Allows addressing of network gateways (routers) and enables communication beyond subnet limits

TS Adapter	V3.0	V5.0	V5.1	V5.2
Transmission speed to PC	19.2 Kbps	19.2 Kbps and 38.4 Kbps	19.2 Kbps and 38.4 Kbps	19.2 Kbps and 38.4 Kbps
Transmission speed of Adapter-Modem interface	2.4 Kbps 4.8 Kbps 9.6 Kbps 19.2 Kbps 38.4 Kbps	2.4 Kbps 4.8 Kbps 9.6 Kbps 19.2 Kbps 38.4 Kbps 57.6 Kbps 115.2 Kbps	2.4 Kbps 4.8 Kbps 9.6 Kbps 19.2 Kbps 38.4 Kbps 57.6 Kbps 115.2 Kbps	2.4 Kbps 4.8 Kbps 9.6 Kbps 19.2 Kbps 38.4 Kbps 57.6 Kbps 115.2 Kbps
Transmission speed of MPI/DP network	187.5 Kbps	9.6 Kbps to 1.5 Mbps	9.6 Kbps to 1.5 Mbps	9.6 Kbps to 1.5 Mbps
DP transport protocol [1]	–	✔	✔	✔
Routing support [2]	–	✔	✔	✔
Call from PLC with "PG_DIAL" FB	–	✔	✔	✔
Access protection	–	✔	✔	✔
Baud rate and profile search	–	–	✔	✔
Services with slave initiative	–	–	✔	✔
PLC – PLC coupling with "AS_DIAL" FB	–	–	✔	✔
Sending an SMS with FB "SMS_SEND"	–	–	–	✔

[1] Enables communication with slaves on MPI/DP network

[2] Allows addressing of network gateways (routers) and enables communication beyond subnet limits

8   Approvals

8.1   Approval for USA and Canada

UL/CSA approval

Important for the U.S.A. and Canada:

	The characters stamped on a device are indicative of the requirements which that device meets:
(UL)	Underwriters Laboratories (UL) to the UL 1950 standard, Report E11 5352
C(UL)	Underwriters Laboratories (UL) to the Canadian standard C22.2 No. 950
(UR)	UL recognition mark
(CSA)	Canadian Standard Association (CSA) to standard C22.2 No. 950 or C22.2 No. 220, Report LR 81690
◇FM◇ APPROVED	FM approval to Factory Mutual Approval Standard 3611.

FM Approval

FM approval to Factory Mutual Approval Standard 3611.

Warning

Personal injury or property damage can result.

In hazardous areas, personal injury or property damage can result if you close or disconnect an electrical circuit during operation (e.g. plug-in connections, fuses, switches).

Do not close or disconnect any live circuits unless explosion hazards can be definitely excluded.

Warning

WARNING - DO NOT DISCONNECT WHILE CIRCUIT IS LIVE

UNLESS LOCATION IS KNOWN TO BE NON-HAZARDOUS

8.2   Approvals for Europe

EMC Guidelines

The following applies for the SIMATIC product described in this manual:

CE

The device meets the requirements of EU Directive 89/336/EEC "Electromagnetic Compatibility" and has been designed for the following areas of application as per the CE marking:

Area of Application	Requirements:	
	Emitted interference	Noise immunity
Domestic, business and commercial, including small businesses	**EN 50081-1: 1992**	EN 50082-1: 1992
Industrial	EN 50081-2: 1993	**EN 50082-2: 1995**

Declarations of Conformity

In accordance with the above-mentioned EU Directive, Article 10 (2), the EU declarations of conformity and the associated documentation are held at the disposal of the competent authorities at the address below:

> Siemens Aktiengesellschaft
> Bereich Automation and Drives
> A&D AS RD 4
> Postfach 1963
> D-92209 Amberg

Observing the Installation Guidelines

Care must be taken both at startup and during operation that the installation guidelines and safety information provided in 2the documentation be carefully observed.